# What Keeps Columbus Cooking? A Survey of Cooking Behavior

An Undergraduate Thesis

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## Abstract

In the last thirty years, the U.S. has seen a rapid decline in home scratch cooking alongside a rise in chronic non-communicable diseases such as heart disease, diabetes, and cancer; yet little research has been done to assess cooking behavior and its possible effects on chronic disease. The purpose of this research is to ascertain the factors contributing to cooking behaviors among adults in Ohio State University campus area of Columbus, Ohio. This study included 150 participants, recruited at three different sites: a natural foods grocery store, a fast food business, and a food pantry. After providing consent, each participant completed questions that collected data on sociodemographic characteristics, cooking behaviors, and factors promoting or hindering scratch cooking. Study data was analyzed using chi-square tests. Results showed that a majority (72%) engaged in scratch home cooking for more than 50% of their meals. Health was the most frequently reported factor contributing to participants' scratch cooking behavior while time was the most frequently reported factor that hindered home cooking. Skill was the lowest rated factor for all demographics. Students cooked at home from scratch significantly less than non-students (31% v 81%; $p < 0.00001$). The differences in cooking behaviors based on race or income were not significant. Cooking behaviors were similar for participants at food pantry and high-end grocery store, while it differed greatly for those at a fast food restaurant ($p = 0.000382$). Since health was the main factor behind participants' scratch cooking, researchers and nutrition practitioners need to continue to find avenues for the promotion of healthy cooking behaviors within this population, while addressing the other barriers, such as time and money. The population in greatest need of intervention are younger people and students. Further research needs to be done on establishing proper standardized methodology, cooking definitions, addressing diverse populations, and studying various locations in the U.S.

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## Chapter 1: Background

Before the advent of large food corporations seen after World War II, farming, food, and nutrition concepts were interdependent ideas in now industrialized societies, critical to the existence of the home-cooked family dinner. Agriculture was localized and families usually ate what was produced within their community or what they produced themselves, passing on these traditions to future generations (McNeill & Mauldin, 2015; Nestle, 2002). According to The Center for Disease Control and Prevention (CDC, 2014) only 13.4 % of the population was obese, with 0.9% were extremely obese (Body Mass Index>30) at the beginning of rapid agriculture and food industrialization (around 1960). After World War II, the emergence of the two-income household, the U.S. interstate system, the growth of large multi-national food corporations, and the modern day "conventional" agribusiness, led to shifts in U.S. cooking and eating habits. With the rise in two-parent-employed households, home cooking decreased with increased pre-made, sodium-heavy, convenience foods and "T.V. dinners" present in the aisles of new corporate grocery stores (Nestle, 2002).

An effect of these events is that the U.S. has been cooking less and eating more food out of the home than ever before. Time spent on cooking has declined by almost 40 % from 1965 to 1995, with the average citizen spending half their food budget on restaurants (Freedman et. al., 2014; Virudachalam et. al., 2013). This is an increase from 1970, where only 33% of budget was spent on restaurants (Taillie and Poti, 2017; Wrieden et. al., 2007) 75% of the population eats outside the home at least once a week totaling about 119 meals eaten outside the home per year. The latest (2015) U.S. Dietary Guidelines for Americans stated that two-thirds (67%) of the calories consumed by the U.S. population are purchased at a store, such as a grocery store or supermarket, and consumed in the home. It also stated that an increased amount of food

measured is consumed away from home (33%) compared to 1977 (18%) (USDA, 2015). Hominids have been cooking since 1.8 million years ago, giving *Homo sapiens* the nutrition to grow the complex brains, being paramount in the physical, social, and community development of human civilizations (Wrangham, 2009). Therefore, it is important to consider how the loss of such a critical tool in human advancement could affect the future physical and social well-being of the U.S. (Albala, 2009).

By the year 2000, the obesity rate was up to 30.1%, with 5.4% extremely obese (a 17% and 4.4% increase respectively) (CDC, 2014). Heart disease is the second highest cause of death in the U.S. followed by cancer and stroke, each of which has been attributed to the obesity epidemic and lifestyle-related factors, such as diet and cooking. Thirteen years later, the most current obesity rate in the U.S. (2013-2014) of adults is 38% (Ogden et. al., 2014). This is an increase of 24% since 1960, and most recently an 8% increase in less than 15 years. This is concerning, leading many health professionals to research plausible causes, namely food and lifestyle. Compiled data of National Health and Nutrition Examination Survey (NHANES) from the 1990s until 2009 showed each meal eaten away from home leads to an increase of 130 calories consumed per day. Increased home food preparation is also correlated with lower incidence of obesity and associated chronic diseases since it provides less total calories, saturated fat, cholesterol, and sodium, along with more fiber, calcium, and iron compared with food away from home (Reicks et. al, 2014, USDA, 2015). The behavior of eating at home daily can decrease risk of obesity by 6% (Taillie et. al, 2017).

U.S. residents cook less than residents of most other countries, often relying on restaurants and food corporations to dictate their tastes, choices, and nutrition (Calamia, 2011). The increased consumption of high caloric, low nutrient-dense food has led to over-nutrition,

micronutrient deficiencies, and chronic diseases. It also paradoxically feeds the food insecurity-chronic disease cycle often experienced by those who cannot access fresh foods (McMillan, 2016; Winne, 2008). Multiple sectors of our society have attempted to address this. Medical professionals, who have received very little nutrition education, rely heavily on medications and eventually surgery to correct many chronic illnesses, while business professionals have created a multi-billion-dollar diet fads, supplemented food products, and workout programs (Nestle, 2002). Rather than attempting to correct these problems with complicated modern technologies, it is very possible there is a simpler solution, such as returning to home and scratch cooking.

Home cooking is something that humans have done for most their existence and until recently, it was a necessity for survival. (Wrangham, 2009) The historical, cultural, and social reasons behind the decline of scratch cooking are understood, but the current behavioral or social factors that explain this decline are not well understood (Smith et. al., 2013 and Mancino, 2009). This research explores the current social, economic and logistical factors of cooking behaviors of adults living in Columbus, Ohio. It specifically sought ways to understand who cooks from scratch and investigate whether this differs across race, age, income, and gender and explored associations between behaviors, demographics, and factors of cooking behavior such as time, money, access, skill, and health concerns. It also explored which factor contributed to cooking behavior most, and for whom. This baseline evidence about barriers and facilitators to different cooking behaviors is useful for public health practitioners interested in developing cooking-based interventions to address the aforementioned public health epidemic of obesity and associated chronic disease.

## Chapter 2: Literature Review

Research around the topic of cooking behavior research is scant compared to that of other related topics such as food consumption, BMI, and genetics. Cooking behavior, especially the factors behind one's cooking behavior such as access, time, money, and cooking skills, is a rarely studied factor in people's diet, nutrition, and health. Yet, current evidence shows there is a relationship between the decline in home cooking and the rise in obesity (Smith et al, 2013; Virudachalam et. al., 2013; Wolfson et. al. 2016). Few studies have investigated the relationship between at home cooking and health (i.e. lower fat and calorie intakes or higher consumption of fruits and vegetables), but even fewer studies have examined the factors leading to these shifts in cooking behavior addressed in this research (Wolfson & Bleich, 2014).

Smith et al. (2013) analyzed the 2008 National Health and Nutrition Examination Survey (NHANES) and found the decline in home cooking was associated with decreased fruit and vegetable consumption, increased calorie consumption, and increased likelihood of developing lifestyle-related diseases. The study also emphasized that there was limited research about definitions of "scratch cooking," barriers to home cooking, and the obesity-poverty cycle (Smith et al, 2013). Similarly, using NHANES data, Virudachalam, et. al (2013) assessed the prevalence of cooking dinner at home in the U.S. and determined whether home dinner preparation habits were associated with socio-economic status, race/ethnicity, country of birth and family structure. Study findings demonstrated significant changes in cooking behaviors based on socioeconomic status (SES), nationality, family size, and race (Virudachalam et. al., 2013). The correlation between SES, race, and cooking behavior was especially significant. They stated that this data is critical in creating group-specific public heath interventions aimed at increasing home cooking behavior. They also note the limitations of using NHANES, which does not account for living

environment, ideologies of health, or employment/ status, or student status (CDC, 2010). Other gaps mentioned include standardized definitions of home meals/cooking, factors which affect cooking behavior choices, the relationship between BMI and food preparation, and scalable health interventions to address diverse groups (Virudachalam et. al., 2013). A study of NHANES participants by Wolfson et. al. (2015) also found similar cooking behaviors which were then compared to their diet quality and weight loss. A positive correlation was found between increased home cooking and better diet quality and weight loss; low frequency cooking was associated with higher consumption of fat, sugar, and kcals and lower fiber (Wolfson & Bleich, 2014). This is because foods eaten away from home are typically calorically dense and lower in nutrients, which is associated with increased obesity (Wolfson & Bleich, 2014). It also emphasized more research in barriers to cooking and cooking definitions, based on this association between health and home cooking.

One exploratory study analyzed participants' perceptions of cooking to ascertain standardized cooking definitions (Wolfson et. al, 2016). Conducted in Baltimore, it attempted to compare definitions across low and high SES groups. Wolfson et. al. found that large gaps between individual definitions of scratch cooking exist, based on whether heat, scratch ingredients, or convenience foods are used (Wolfson et. al, 2016). Some indicated scratch cooking could be anything made at home, even a pre-made meal, and others claimed scratch cooking meant every ingredient was made in house (Wolfson et. al, 2016). No universal definition of cooking existed, even within a single neighborhood, income, or a shared level of food access. However, they did find a significant number of participants under thirty years old had the former definition including convenience foods compared to older (Wolfson et. al, 2016). The study participants also assessed participants' greatest barriers to scratch cooking, which

included time, money, and lack of enjoyment and commonly-cited facilitators to cooking which were organization, planning, and enjoyment of cooking (Wolfson et. al, 2016). They discuss it further to ascertain proper definitions for assessing cooking behavior, especially for studies to differentiate cooking from scratch cooking and if this definition has changed over time as scratch cooking has declined. Lavelle et. al. (2016) conducted a similar study in Ireland assessing perceptions of cooking definitions. They found that scratch cooking was associated with better health and increased enjoyment while the barriers included time, money, lack of enjoyment, family preferences, and skill. They did not find associations between any demographic characteristics and differing cooking definitions (Lavelle et. al., 2016).

Overall, there exists a lack of measurement standardization in the field of cooking behavior, something which limits the ability to make correlations or causations in studies. Comprehensive reviews of all cooking behavior interventions including studies from 1980 to 2015 have attempted to draw conclusions about cooking behavior in the U.S. Skill was found to be the most consistently assessed behavior related factor in most cooking behavior interventions with limited considerations for other environmental and social factors (Raber et. al, 2016; Reicks et. al, 2014) Overall both reviews concluded that the non-rigorous study designs, varying study populations, and the use of non-validated assessment tools limit conclusions about cooking behavior over time (Raber et. al, 2016; Reicks et. al, 2014 and Raber et. al, 2016).). The authors also caution implementation of health interventions without consistent data to support the strategies, due to the diverse and individualized factors relating to cooking behavior. They stressed the need for well-designed consistent studies so that the long-term impacts of cooking behavior, dietary intake, and health outcomes can be consistently evaluated (Raber et. al, 2016; Reicks et. al, 2014 and Raber et. al, 2016).

The most consistent assessment of cooking behavior is conducted by the U.S. government. The *Flexible Consumer Behavior Survey* is a collaboration between the USDA, National Institutes of Health, and Economic Revenue Service to assess diet quality, perceptions, awareness of federal nutrition programs, and the amount of food consumed away from home. This data is pulled from NHANES to form fact sheets every five years for researchers to use (USDA, 2010, 2015). Other than this, no consistent measurement of cooking behavior over time exists.

Few studies have attempted to properly measure cooking behavior, which has made it difficult for public health and nutrition professionals to perform beneficial interventions; yet some are attempting. For example, a combined strategy of gardening, nutrition, and cooking classes led to health improvements in Latino children in the Los Angeles area and in New York City schools (Davis et. al, 2011; Liquori, et. al 1998). Many cities all over the country are implementing cooking intervention programs such as Cooking Matters, in order to address this decline by increasing cooking skills and ability (Mancino et. al., 2009). While civil society, the scientific community, and government agencies have an interest in discovering what people eat, more research needs to be conducted on the reasons how and why people cook or don't cook in this country for these programs to be effective. This exploratory research hopes to shed light on this lack of standardized methods of measuring cooking behavior and its factors to more effectively address the connection between cooking behavior and health, especially variables not explored in any of the literature.

# Chapter 3: Methods

This mixed-methods research was conducted using a brief in-person survey (N=150) at three sites administered between September 2015 and October 2016. Participants responded to 10 questions about home cooking behavior, potential barriers to cooking, and demographics (See Appendix A and B).The student researcher completed CITI training and obtained IRB exemption for the study from Ohio State University. Participants were asked to give verbal consent before the survey was administered, and three screening questions were used to confirm that the participant was at least 18 years old, lived in Columbus, and understood English. Details of the survey design, sampling method, and data analysis methods are provided below.

## Survey Design

The design was a mixed method stratified sample survey to get a holistic perspective of cooking behavior. Participants were asked if most their food came from cooking at home or not, and if the former, whether that food was majority "from scratch". The definition given to participants for scratch cooking was prepared at home from fresh ingredients which does not include majority convenience foods. The definition of convenience foods was taken from the literature as any fully or partially prepared foods in which less time, culinary skills or energy inputs are needed for preparation due to processing (Wolfson et. al., 2016). The participants then ranked six factors on how much they contribute to their cooking behavior, which included money, time, skill, health, access, and enjoyment, which were developed by the researcher and advisors based on the greatest factors related to cooking behavior shown in research. (Lavelle et. al., 2016,; Raber et. al., 2016; Wrieden et. al, 2007; Wolfson & Bleich, 2014). If the participant had additional comments to contribute, the survey contains an area for qualitative data that were

transcribed. The demographic questions on gender, age, race, income level, and student status were pulled from the food mapping conducted. in Columbus (Kaiser et. al., 2015).

**Survey Sample**

To survey an economically diverse sample representative of the Ohio State University-Columbus campus area in a feasible cost-effective manner for one researcher, three comparative sample sites were used within the zip code 43201. The survey sites include a food pantry (Neighborhood Services Inc), a fast food restaurant (Wendy's), and a natural food supermarket (Lucky's). These were chosen based on their similar diverse population of patrons, proximity to campus and one another, and the fact they are all sites for food distribution.

**Analysis**

Once the surveys were completed all the information was entered into an Excel spreadsheet. Contingency crosstabs were made between variables to see what relationships were statically significant using chi-squared tests. This was chosen to assess the statistical significance of this associations, or if indeed they were based on random chance. The qualitative results were understood using a word cloud, which counts the frequency of significant words in text, which would reveal which themes are most prominent to the participants.

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# Chapter 4: Results

## Sample Demographics

Our original sample include 150 participants, though one was removed through data cleaning for insufficient data. Demographic information is included in Table 1. There was a slight majority of younger people, women, and non-students in the sample with white people having a large majority of the study sample compared to black people or other races. Some unintended results in the demographics revealed an interesting relationship between survey site, race and income level. There was a significant number of people who identified as lower income and black compared to higher income white people, with 67% of black people earning <$10,000-20,000 year compared to only 33% of white people (p=.0191). Similarly, 40% of white people earned over $60,000 per year compared to only 7% of black people.. There was also a significant income gap between participants at the food pantry, with 57% of the latter making <$10,000-$20,000 compared 25% from the natural food store. (p=.014431) Similarly, 13% of those at the food pantry made more than $60,000, compared to 48% at natural food store (fast food participants were both 35%).

## Table 1. Total Sample Demographics

| Table 1: Total Sample Demographics [N=149] | | Food Pantry [N=49] | Natural Food Store [N=50] | Fast Food [N=50] |
|---|---|---|---|---|
| **Variable** | **n, [%]** | **n, [%]** | **n, [%]** | **n, [%]** |
| **Gender** | | | | |
| Male | 60 [41] | 14 [29] | 16 [32] | 30 [60] |
| Female | 87 [58] | 35 [71] | 34 [68] | 20 [40] |
| **Student Status** | | | | |
| Student | 56 [37] | 4 [8] | 14 [28] | 37 [74] |
| Non-student | 93 [63] | 45 [92] | 36 [72] | 13 [26] |
| **Race** | | | | |
| White | 88 [59] | 16 [33] | 38 [76] | 21 [42] |
| Black | 28 [19] | 23 [47] | 2 [4] | 3 [6] |
| All Other | 32 [22] | 10 [20] | 10 [20] | 12 [24] |
| **Income** | | | | |
| <$10,000-20,000 | 55 [37] | 26 [57] | 13 [26] | 17 [34] |
| $20,000-40,000 | 35 [24] | 11 [24] | 11 [22] | 13 [26] |
| $40,000-60,000 | 7 [5] | 3 [7] | 2 [4] | 2 [4] |
| $60,000 + | 47 [32] | 6 [13] | 24 [48] | 17 [34] |
| **Survey Site** | | | | |
| Food Pantry | 49 [33] | - | - | - |
| Natural Food Store | 50 [33] | - | - | - |
| Fast Food | 50 [33] | - | - | - |
| **Age** | | | | |
| 18-30 | 74 [50] | 9 [18] | 22 [44] | 44 [88] |
| 31-60 | 50 [34] | 23 [47] | 22 [44] | 5 [10] |
| 61+ | 24 [16] | 17 [35] | 6 [12] | 1 [2] |
| **#1 Behavior Factor** | | | | |
| Health | 63 [42] | 27 [55] | 23 [46] | 14 [28] |
| Time | 22 [15] | 2 [4] | 7 [14] | 13 [26] |
| Money | 31 [21] | 12 [24] | 6[12] | 12 [24] |
| Access | 16 [11] | 5 [10] | 6 [12] | 5 [10] |
| Enjoyment | 22 [15] | 6 [12] | 12 [24] | 3[6] |
| Skill | 6 [4] | 2 [4] | 2 [4] | 2 [4] |
| **Cooking Behavior** | | | | |
| At Home from Scratch | 107 [72] | 42 [86] | 42 [84] | 22 [44] |
| At Home Only | 17 [11] | 6 [12] | 1 [2] | 10 [20] |
| Neither | 25 [17] | 1 [2] | 7 [14] | 18 [36] |

## Cooking Behaviors

Out of the 149 participants interviewed, 11% cooked convenience foods at home, 72% cooked at home from scratch, and 17% reported majority not cooking at home (Table 1). The significance of each factor affecting cooking behavior were in descending order: health (42%), money (21%), enjoyment (15%), time (15%), access (11%), and skill (4%).

## Open Ended Responses

Each participant was also asked, "Are there additional details regarding your cooking and eating behavior you would like to add?" Of those surveyed, 100 participants responded to this prompt, with 49 not responding. Since each answer had multiple factors stated, the qualitative responses totaled more than 100%. The factor frequency mentioned was in this descending order; health (35%), enjoyment (29%), access (23%), time (18%), money (15%), and skill (4%). The qualitative also revealed other factors not present in the quantitative survey including family/culture/tradition (16%), safety (7%), socialization (6%), and sustainability (2%). Altogether, the ranking of factors was health, enjoyment, access, time, family/tradition/culture, money, safety, socializing, skill, and sustainability (Table 2). Topics related to health remained the largest factor mentioned in response to the question, with other words like "food", "cooking", "eating", "time", and "home" very frequently stated. (Figure 1). The additional categories were added in attempts to accurately represent the responses.


**Figure 1: Word cloud of qualitative research. Size of words indicates increased frequency of words mentioned in the survey.**

**Table 2. Qualitative Open Ended Responses**

| Table 2: Open-Ended Responses (N=100) | | |
|---|---|---|
| **#1 Behavioral Factor (Quantitative Rank)** | **Responses** | **Qualitative Rank** |
| **Health (1)** | 35 | 1 |
| **Creativity/Enjoyment (3 or 4)** | 29 | 2 |
| **Access (5)** | 23 | 3 |
| **Time (3 or 4)** | 18 | 4 |
| **Tradition/Culture** | 16 | 5 |
| **Money (2)** | 15 | 6 |
| **Safety** | 9 | 7 |
| **Socialization** | 6 | 8 |
| **Skill (6)** | 4 | 9 |
| **Sustainability** | 2 | 10 |

**Health.** Most participants mentioned health reasons relating to their cooking behavior, especially scratch cooking. Many indicated specific diseases have influenced them to change their cooking behavior.

*"I woke up blind one night last year due to problems with high blood pressure, high cholesterol, and diabetes. I then decided to change diet in order to get healthier. Things are definitely getting better since then." (participant #8 from the food pantry)*

*"I enjoy cooking a plant based diet. I had a heart attack 8 years ago, which led to drastic change in diet. I eliminated meat and dairy. I did not want to go on statins, so changing diet was the only option." (participant #123 from natural food store)*

*"I was a borderline diabetic taking metformin. I switched from processed foods to raw, unprocessed foods and then my insulin problems were reversed. I will never go back." (participant #41 from food pantry)*

**Enjoyment.** There was a mixture of people who enjoy cooking vs. people who enjoy the taste of outside food more than their own cooking.

*"Cooking is enjoyable and relaxing. It is fun to make new things." (participant #101 from natural food store)*

*"I enjoy outside food more than anything I could cook at home. I have a small kitchen which limits the amount of cooking possible for me since I have no time." (participant #65 from fast food)*

**Money and Access.** Participant's stated that affordability and access to fresh, raw ingredients for scratch cooking usually went hand in hand.

*"My family went through bouts of unemployment and then a house fire, so we had no money. The local food pantry offered healthy food and we learned to cook them since we had nothing. I grew up cooking and gardening with organic chickens, so it was nice to get back. This was cheaper and healthier for us." (participant #20 from the food pantry)*

*"I don't have a good kitchen so cooking is difficult, especially to cook at home from scratch. I also don't have a car and have bad feet so walking to the store is not possible. I have to carpool or take the bus" (participant #144 from natural food store)*

*"I eat the same things all the time since I am in college. It is cheap and convenient. My friends and I always say, 'throw it on the grill and it'll be alright.'" (participant #86 from fast food)*

*"I am homeless. I live on campsites so cooking from scratch is difficult with no kitchen, only fire…I get most of my food from Krogers." (participant #88 from fast food)*

**Time.** Lack of time was associated with work, school, and children, while having enough time associated with opposite.

*"I work two jobs so there is no time to cook at home. This is bad because I am trying to get off metformin meds for diabetes. It has been difficult." (participant #106 from natural food store)*

*"Time is a huge factor as well as money since I am a college student. I did take a human nutrition class to become more health conscious." (participant #124 from natural food store)*

*"I live on campus and eat at the dining halls. There is not enough time to do anything other than school and I work there so I eat there for free." (participant #141 from natural food store)*

*"I am currently unemployed so now I have tons of time to cook from scratch. I enjoy it since it is fun and relaxing." (participant #102 from natural food store)*

**Family and culture.** A critical factor not covered in the quantitative is whether participants lived with a family, dependents, or alone. Family, especially children, were found to influence cooking behavior as well as concern with health and money.

*"I have health issues which I don't want to have happen to my kids. I feel better with fresh, raw foods and want to pass down a healthy lifestyle to them to prevent future illness. We enjoy cooking together." (participant # 18 from the food pantry)*

*"It is better for kids to have well balanced meal and teach them how to cook. I want to pass on traditional family meals to them." (participant #6 from food pantry)*

*"I cook Southern style food which I was taught by grandparents." (participant #54 from fast food)*

*"I have a garden and I learned how to pickle vegetables from my grandparents in order to pass it down to next generation. I hope to do the same with my kids." (participant #14 from food pantry)*

*"I like my cooking more than anything anyone else can make since there is no Egyptian food in Columbus." (participant #4 from food pantry)*

**Safety.** Another factor not mentioned in the quantitative was participants cooking mainly from home to ensure the safety of their food, whether it be from restaurants, manufacturing plant, or agricultural negligence.

*"I do not trust outside food, especially GMOs which I know affect human health." (participant #111 at the natural food store)*

*"I work in the food service industry and I have seen some poor handling. The food's safety is only known if I cook my own food. I don't want to get sick." (participant #34 from food pantry)*

**Socialization.** Another factor not covered in the quantitative is cooking for social purposes, whether it was with friends or family members.

*"Cooking is fun entertainment for social gatherings. It is fun to cook together with friends and family. There are some important family times which happen during meals. It is also a great creative outlet." (participant #130 from natural food store)*

*"I do not have much time for cooking or socializing being a student. I am never at home. So, going out to eat with friends is my social activity." (participant #89 from fast food restaurant)*

**Sustainability**. Only two participants mentioned environmental concerns for their cooking behaviors, but they were the top factors for those individuals.

> *"I work at a catering company and I see the amount of excess food wasted in industry. I try to take as much food home, since food waste and the environment are very important to me. That is why I am vegan. Health also plays a large factor." (participant #112 from natural food store)*

**Skill**. Though this was not mentioned by very many participants, one person shared this:

> *"I eat mainly meat because I know how to cook it. Things such as hamburger helper and bratwurst. I also live alone so I cook mainly for myself. I do not cook many vegetables since they spoil quicker and I don't know how." (participant #44 from the food pantry)*

## Association Between Demographics and Cooking Behavior

These associations were also analyzed with chi square tests. Students cooked from scratch significantly less than non-students (31% v 81%; $p < 0.00001$), with 50% of students getting outside food compared to only 9% nonstudents. People over 61 years old did scratch cooking more than younger people (81% v. 60%; $p = 0.0079$) with 28% of 18-30 year olds doing no home cooking compared to only 4% of those over 61 years old. Women cooked from scratch significantly more than men (80% v. 60%, $p = 0.003$) with men doing no home cooking two times as much (24% v. 12%). Participants surveyed at a food pantry had similar cooking behaviors as the sample from the high-end grocery store (both 84% at home from scratch) and vastly different than those outside of a fast food business (44% from scratch) ($p = 0.000382$). 36% of the participants at the fast food restaurant did no home cooking compared to 14% from the food pantry, and 2% from the natural food store. This lack of scratch cooking could be confounded with student status since many the participants at the fast food location were students. The differences in cooking behaviors based on race or income was not significant (Table 3).

## Table 3. Associations Between Demographics and Cooking Behaviors

| Table 3: Sample Variables vs. Cooking Behavior [N=149] (n, [%]) | | | | |
|---|---|---|---|---|
| **Variable** | **At Home from Scratch (N=107)** | **At Home Only (N=17)** | **Neither (N=25)** | **P-Value** |
| **Gender **** | | | | 0.003 |
| Male | 36 [60%] | 10 [17%] | 14 [23%] | |
| Female | 70 [80%] | 7 [8%] | 11 [13%] | |
| **Student Status ***** | | | | 0.0001 |
| Student | 11 [31%] | 7 [19%] | 18 [50%] | |
| Non-student | 76 [81%] | 10 [11%] | 8 [9%] | |
| **Race** | | | | 0.155 |
| White | 64 [72%] | 11 [12%] | 14[16%] | |
| Black | 23[82%] | 3 [11%] | 2 [7%] | |
| All Other | 19 [59%] | 3 [9%] | 10[31%] | |
| **Income** | | | | 0.21 |
| <$10,000- $20,000 | 39 [71%] | 11 [20%] | 6 [11%] | |
| $20,000-$40,000 | 15 [65%] | 1 [4%] | 7 [30%] | |
| $40,000-$60,000 | 4 [57%] | 1 [14%] | 2 [28%] | |
| $60,000 + | 33 [70%] | 4 [9%] | 10 [21%] | |
| **Survey Site **** | | | | 0.0003 |
| Food Pantry | 41 [84%] | 1[2%] | 7 [14%] | |
| Fast Food | 22 [44%] | 10 [20%] | 18 [36%] | |
| Natural Food | 42 [84%] | 6 [12%] | 1 [2%] | |
| **Age **** | | | | 0.008 |
| 18-30 | 45 [60%] | 9 [12%] | 21 [28%] | |
| 31-60 | 39 [78%] | 7 [14%] | 4 [8%] | |
| 61+ | 21 [81%] | 4 [15%] | 1 [4%] | |
| **#1 Behavior Factor***** | | | | 0.0001 |
| Health | 60 [92.3%] | 3 [4.6%] | 2[3.1%] | |
| Time | 7 [31.8%] | 3 [1.4%] | 12 [54.5%] | |
| Money | 20 [66.7%] | 8 [26.7%] | 2 [7.0%] | |
| Access | 8 [50%] | 1 [6.3%] | 7 [43.8%] | |
| Enjoyment | 19 [86.4%] | 1 [4.5%] | 2 [9.1%] | |
| Skill | 4 [66.7%] | 1 [16.7%] | 1 [16.7%] | |
| ***p < 0.05 **p < 0.01 ***p < 0.001 from chi square test** | | | | |

**Association Between Demographics and Factors Affecting Cooking Behavior**

Comparisons using chi square tests between demographics and the factors named the primary reason behind participants' cooking behavior reveal the barriers and facilitators to cooking (Table 3). Health was the top factor overall in participants cooking behavior (42%), with those most concerned with health cooking from scratch more than any other behavior (92% v. <5%). 51% of people who cooked at home from scratch named health their primary factor ($p < 0.0001$). Time was the greatest factor for those who on average did not cook at home (46%) and 55% of those participants said it was their primary factor. A significant number (60%) of non-students named health their primary factor compared to students (22%), whose top factor was money (37% v. 6%; $p < 0.0001$). Similar with cooking behavior, participants from the food pantry and natural food store had similar primary factors, with 40% and 49% naming health their top factor respectively, compared to only 28% at the fast food restaurant ($p= .004$). Similarly, those from fast food had significantly more people claiming time (24%) as primary factors compared to food pantry (4%) and natural food store (13%). Both fast food and food pantry had 23% choosing money as the primary factor, while only 11% did so from the natural store, which had significantly more choose enjoyment (22%) over fast food (7%) or the food pantry (11%). Older people (older than 61 years) were much more likely to claim health (57% v. 26%) and enjoyment (29% v. 9%) as their primary factor while very unlikely to claim time as a factor compared to people between 18-30 years old (0% v. 20%, $p = 0.027$). The correlations between gender, race, and income were found to be insignificant.

## Table 4. Associations Between Demographics and Cooking Behavior Factors

| Table 4: Sample Demographics s vs. #1 Factors in Cooking Behavior [N=149] (n, [%]) | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Variable** | **Health** | **Time** | **Money** | **Access** | **Enjoyment** | **Skill** | **P-Value** |
| **Gender** | | | | | | | 0.06 |
| Male | 26 [37%] | 1 [1%] | 4 [6%] | 6 [8%] | 10 [14.1%] | 4 [6%] | |
| Female | 38 [42%] | 10 [11%] | 19 [21%] | 9 [10%] | 13 [14%] | 2 [2%] | |
| **Student Status ***** | | | | | | | 0.0001 |
| Student | 11 [22%] | 7 [14%] | 18 [37%] | 7 [14%] | 3 [6%] | 3 [6%] | |
| Non-student | 76 [60%] | 10 [8%] | 8 [6%] | 9 [7%] | 19 [15%] | 3 [2%] | |
| **Race** | | | | | | | 0.30 |
| White | 33[37%] | 12[14%] | 18[20%] | 8[9%] | 13[15%] | 5[6%] | |
| Black | 16[49%] | 3[9%] | 7[21%] | 2[6%] | 4[12%] | 1[3%] | |
| All Other | 6[20%] | 7[23%] | 5[17%] | 6[20%] | 5[17%] | 0 | |
| **Income** | | | | | | | 0.28 |
| <$10,000- $20,000 | 24[40%] | 8[13%] | 14[23%] | 2[3%] | 8[13%] | 4[7%] | |
| $20,000-$40,000 | 13 [37%] | 7 [20%] | 8 [23%] | 5[14%] | 2 [6%] | 0 | |
| $40,000-$60,000 | 4[57%] | 0 | 2[39%] | 1[14%] | 0 | 0 | |
| $60,000 + | 20 [38%] | 6 [11%] | 6 [11%] | 8[15%] | 11 [21%] | 2[4%] | |
| **Survey Site**** | | | | | | | 0.004 |
| Natural Food | 22 [40%] | 7 [13%] | 6 [11%] | 6 [11%] | 12 [22%] | 2[4%] | |
| Fast Food | 14 [28%] | 13 [24%] | 12 [22%] | 5[9%] | 4 [7%] | 2[4%] | |
| Food Pantry | 26 [49%] | 2 [4%] | 12 [23%] | 5[9%] | 6 [11%] | 2[4%] | |
| **Age*** | | | | | | | 0.03 |
| 18-30 | 27[36] | 15 [20%] | 13[17%] | 9[12%] | 7[9%] | 4 [5%] | |
| 31-60 | 25[41%] | 7[12%] | 14[23%] | 4[7%] | 9[15%] | 2[3%] | |
| 61+ | 12[57%] | 0 | 3[14%] | 3[14%] | 6[29%] | 0 | |
| ***p < 0.05 **p < 0.01 ***p < 0.001 from chi square test** | | | | | | | |

## Chapter 5: Discussion

Overall the results of my study were similar when compared to other cooking behavior studies in the literature which exist, but differed in some areas. A major finding in this research is that the primary cooking behavior for more than half of participants' meals was scratch cooking (72%), with 11% in home cooking only and 17% mostly out of the home eating. The NHANES studies found that 49 % of the U.S. population always cooked dinner at home, with 43% sometimes and 8% rarely (Smith et. al., 2013, Virudachalam et. al. 2013 and Wolfson et. al., 2016). This comparison is limited due to the lack of NHANES data on type of home cooking involved. The amount of participant's cooking from scratch is higher than the researcher anticipated due to the overall decrease in scratch home cooking. This comparison is limited due to the lack of data on the amount of scratch cooking done in the past, although it is assumed that before 20$^{th}$ century industrialization , it was about 100% with infrequent restaurant visits (Wrangham, 2009). Therefore, even these higher numbers would still be a decline from 100%. It is important to note that when participant's cook at home, they are more likely to cook from scratch than not, although this definition is not clear exactly what that entails on the individual basis (Wolfson et. al., 2016).

Another interesting finding is that 42% of participants rated health their top factor and it was consistently the top factor for every demographic. Health was highly correlated with scratch cooking (92%), with enjoyment being the second highest (86%). It was also a top factor found in this zip code by Kaiser et al. (2015). NHANES studies show that high SES cooked for enjoyment and general health purposes more than low SES, with low SES had more incidence diet-related diseases (i.e. obesity) than high SES. (Smith et. al., 2013; Virudachalam et. al., 2013; Wolfson & Bleich, 2014). Another study analyzed diet quality to find that low SES were less concerned

about health due to their barriers of time, money, and access, compared to high SES (Wolfson & Bleich, 2014). Wolfson et al. study on perceptions found that home cooking in general was associated with having more time, increased safety, and more healthy foods (Wolfson et. al., 2016). All research agreed that most people care about health, but ideas about health, enjoyment, and scratch cooking are not measured in NHANES, so data is limited in many studies.

The connection between race, income, and cooking behaviors is a prominent theme in the literature, a relationship which was not significant in my study (Taillie et. al., 2017; Virudachalam et. al., 2013; Wolfson et. al., 2016). Money was the second highest factor mentioned, but was not a significant barrier, nor was it correlated with low income. Time (55%) and access (44%) were more highly correlated with not cooking at home than money (7%). Viruduchalam et al. (2013) also found time was a large factor for not eating at home, but was also significantly correlated with low SES and income (Virudachalam et. 2013). That study also hypothesized that households with increased income can choose to eat something other than a home-cooked meal several nights per week, which is why they cooked at home sometimes (2-5 dinners) while poorer, less educated households could be forced to either always or never cook dinner at home (Virudachalam et. al., 2013). This research found a significant correlation between race and income, with black people being of lower income than white people, but this correlation did not extend into cooking behaviors or factors, unlike the NHANES studies which show a connection between black people and decreased meals at home (Smith et. al, 2013 and Virudachalam et. al., 2013). Kaiser et al. (2015) found similarly that only 11% of the population of this area said food prices were a barrier to their food choices (Kaiser et. al., 2015). Perhaps participants in Columbus, and specifically this area, have less income issues with regards to food

and cooking than other areas of the U.S. or other larger cities such as Baltimore, where this research has been done.

Many other factors in this research have little comparison found in the literature. Virduchalam et al. (2013) and Wolfson et al. (2016) briefly discuss the barriers of time, access, and money for low SES participants, but it was not a focus of their study due to the limitations of the NHANES data set (Virudachalam et. al., 2013; Wolfson et. al, 2016). Skill was not very significant at all no matter demographics or behavior, which contradicts Lavalle et al. (2016), and Reicks et al. (2014) who both found that skill was a large barrier to increasing scratch cooking behavior (Reicks et. al., 2014 and Lavelle et.). The connection between student status, age, and gender with cooking behavior were all statistically significant. Older people and non-students were more likely to cook at home from scratch, due to increased time available. Tallie et al. (2017) discussed a connection between younger people and decreased cooking at home, but did not measure the factors affecting this (Taillie et. al., 2017). Women also had increased rates of cooking from home and scratch than men, but the factors relating to this were not statistically significant. None of the literature discussed student status or gender.

A strength of this mixed methods study is that it demonstrates not only the relationships between demographics and cooking behavior, but also cooking factors and participant location, something not found often in the literature. The cooking behaviors and factors of food pantry and natural food store clients were very similar (from scratch and health based), while starkly different from participants at a fast food store, which did little home cooking for mainly time money reasons. This is most likely because mainly ingredients are obtained at the former and prepared meals are obtained at the latter, although many supermarkets now have pre-made meals

for purchase. The high prevalence of students surveyed at the fast food restaurant could be confounding the high amount which don't cook from home.

Some factors not measured in this study that are pertinent to the study of cooking behavior include employment, dependent, education, and citizenship status. Wolfson and Bleich (2014) and Reicks et al. (2014) found that female employment is highly correlated with decreased scratch cooking (Wolfson and Bleich, 2014 and Reicks et. al., 2014). NHANES studies showed that having dependents and higher educational attainment increases likelihood of home cooking, as well as not being born in the U.S. (Smith et. al, 2013; Virudachalam et. al., 2013). The qualitative portion also revealed a few factors not measured in the quantitative, which include culture, safety, sustainability, and family categories. Similar to the research literature, family and dependent status were primary factors in the open-ended section, especially regarding scratch cooking behavior. Another question that should be included in future studies is if participants' cooking behavior was their desired choice or involuntary based on these factors.

**Limitations**

Many limitations exist due to the exploratory nature of this research. The independent bias in the study would come from the very small sample size, which was less than 1% of the Columbus population and the population of the three zip codes studied (Onboard Informatics, 2017). It is also important to note that only certain groups of people would be going to these locations, which would be a barrier for homebound or disabled peoples. The stratification of the survey at three diverse locations attempted to give a representative sample, since different people tend to be at natural food stores compared to food pantries and fast food restaurants. Even though the chi-square analysis would have accounted for this in the analysis of significance, a sample so small in such a limited area cannot be fully representative of all of Columbus, let alone Ohio or the U.S. Another

unavoidable error would have come from the participants, namely social desirability bias and indiscretions about "from scratch" definitions. Social desirability bias occurs frequently in nutrition research, with participants reporting more "desirable" characteristics to researchers rather than actual behaviors (Krumpal, 2013). This could explain for the high amount of reported scratch cooking behavior and importance of health. Much of the research has discussed how individual definitions of cooking behaviors are not standardized, resulting in difficult comparisons between participants (Lavelle et. al., 2016 and Wolfson et. al, 2016).

On behalf of the researcher, significant effort was taken to avoid selection bias by asking every available, appropriate person at each site to take the survey. There were also some missing aspects of the survey that would have made it more holistic, such as asking about employment and dependent status as well as separating the factors between barriers and facilitators. There were also some non-responses for certain categories which limits the data even further, specifically two in income level and seven in race. Based on these limitations, this research can only observe associations within this population and not causality for a larger overall population.

## Chapter 6: Conclusions

This exploratory study showed several correlations useful to future pertinent research. The novel connections between student status, age, and gender with their corresponding behaviors and factors needs further inquiry for a larger population. The lack of significance between race, income, and cooking behavior also needs further research for this population, since it contradicts other national studies. Scratch cooking also needs more standardized definitions and specified way of measuring its exact frequency. This would lead to more specified effective health interventions for specific groups based on location. Since environment plays a role in cooking behavior, future research should include location of food acquisition in their studies, as it was statistically significant in this research. Since there is such a limited amount of literature from different areas to analyze, comparisons are difficult to make. Overall further research needs to be done to get a more representative sample, not just in Columbus, but in Ohio and the U.S.

This research and the larger literature found that health and scratch cooking are very much present in the minds and lives of people in the U.S., despite the rapid decline in the quality of both. This is good news for public health, government, and nutrition programs who wish to address food and cooking behaviors. Many programs exist in the U.S. to address this decline, yet very little research in which methods intervene most effectively exist. Before putting money into complex quick solutions, it must be fully understood why this problem exists in the first place. Without proper measurement of cooking behaviors or its facilitators/barriers, these programs could be spending thousands of dollars on interventions that have not been proven to increase positive cooking behaviors, especially for specific populations. This problematic lack of standard definitions and measurement across the U.S. only limits the knowledge public health and nutrition professionals must address this epidemic of diet related disease. Other studies of

pharmaceuticals or medical treatments are highly standardized and repeated many times to prove their results and efficacy. What is stopping the field of cooking behavior from doing this? Once these behaviors can be quantified and the problems identified, the health and policy communities can begin to properly address this epidemic hopefully resulting in a healthier U.S. population.

Cooking behavior is rarely included in research around nutritional status, poverty, or food security, something that should be amended based on its connection to increased nutrient dense food intake. If prominent barriers to scratch home cooking are identified, these barriers can be addressed by the proper institutions and professionals, leading to an increase in scratch cooking and decreased diet-related diseases due to higher intake of healthier, nutrient-dense foods. Simultaneously, if great facilitators are identified, those can also be addressed in health interventions for increasing health promoting behaviors. If nothing else, research surveys like these increase the discussion of cooking as well as overall encouraging the community discussion around food consumption, something which serves as an omnipresent unifier and innocuous door to more difficult topics such as poverty, employment status, health disparities and access.

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**Appendix A:** Screening Survey

1. Are you 18 years or older?
    a. Yes
    b. No
2. Do you live in the Columbus area?
    a. Yes
    b. No
3. Do you speak/understand English
    a. Yes
    b. No

**Appendix B:** Main Survey

Cooking (CK)

1) Do you cook/prepare/eat majority (>50%) of food at home? CK1_____
    a. Yes (see question 2)
    b. No (see question 3)
    c. Refuse to answer (995)/ don't know (996)/ NA (997)

*2)* If you cook/prepare majority at home, is the majority (>50%) from scratch cooking? Also means majority is not convenience foods (<50%). *From scratch cooking is defined as food made from raw ingredients, requiring preparation, and possible heating. Convenience foods are described as foods which are pre-cooked, contain instructions, and require little to no preparation. This includes but is not exclusive ready-to-eat dry, frozen, canned, and packaged goods.*
    a. Yes (see question 5)
    b. No (see question 4)
    c. Refuse to answer (995)/ don't know (996)/ NA (997) CK2: _____

3) How much does each of these factors keep you from cooking at home/serve as cooking barriers (1-6/1-7)? 1 meaning a large barrier and 6/7 being a small barrier.

CK3a: _____

    a. Health CK3b: _____
    b. Time CK3c: _____
    c. Money CK3d: _____
    d. Access CK3e: _____

e. Enjoyment (or lack thereof) CK3f: _____

f. Skill CK3g: _____

g. Other (see CK6)

h. Refuse to answer (995)/ don't know (996)/ NA (997) \\

4) How much does each of these factors keep you from cooking at home from scratch/serve as barriers to cooking from scratch (1-6)? 1 meaning large barrier and 6 being a minimal barrier.

CK4a: _____

a. Health CK4b: _____

b. Time CK4c: _____

c. Money CK4d: _____

d. Access CK4e: _____

e. Enjoyment (or lack thereof) CK4f: _____

f. Skill CK4g: _____

g. Other (see CK6)

h. Refuse to answer (995)/ don't know (996)/ NA (997)

5) How much does each of these factors contribute to your tendency to cook at home from scratch (1-6)? 1 meaning large contributing factor and 6 being a minimally contributing factor.

CK5a: _____

a. Health CK5b: _____

b. Time CK5c: _____

c. Money CK5d: _____

d. Access CK5e: _____

e. Enjoyment CK5f: _____

f. Skill CK5g: _____

g. Other (see CK6)

h. Refuse to answer (995)/ don't know (996)/ NA (997)

6) Elaboration and/or f. Other option:

| **CK6:** |
| --- |
| |

I. Demographic Questions (DG)

1) Which range best describes your age? DG1: _____

a) Teens (18-19)

b) 20s (20-29)

c) 30s (30-39)

d) 40s (40-49)

e) 50s (50-59)

f) 60s+ (>60)

g) Refuse to answer (995)/ don't know (996)/ NA (997)

2) Which identifies closest to your gender? DG2: _____

   a) Male
   b) Female
   c) Transgender (FTM/MTF)
   d) Other
   e) Refuse to answer (995)/ don't know (996)/ NA (997)

3) Which race (s) best defines you? (select all that apply) DG3: _____

   a) White
   b) Black or African-American
   c) Asian or Asian American
   d) Hispanic
   e) American Indian or Alaska Native
   f) Native Hawaiian or Another Pacific Islander
   g) Other
   h) Refuse to answer (995)/do not know (996)/not applicable (997)

4) Which best describes your total household income? DG4: _____

   a) Less than $10,000
   b) $10,000 to $19,999
   c) $20,000 to $29,999
   d) $30,000 to $39,999
   e) $40,000 to $49,999

f) $50,000 to $59,999

g) $60,000 to $69,999

h) $70,000 to $79,999

i) $80,000 to $89,999

j) $90,000 to $99,999

k) $100,000 to $149,999

l) $150,000 or more

m) Refuse to answer (995)/do not know (996)/not applicable (997)

5) Are you a student?

a) Yes

b) No

c) Refuse to answer (995)/ don't know (996)/ NA (997) DG5: _____